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ABSTRACT

Four groups of well-functioning senior citizens (6 males and 18 females per group) over the age of 65 were presented with a series of discrimination-learning problems. All were provided four pretraining problems, appropriate to their individual condition, and encouraging self-pacing. Two levels of problem complexity (four-dimensional vs. eight-dimensional problems) were crossed with two levels of a memory-aid variable (limited memory displays provided vs. none provided). Solution on four-dimensional problems was superior to that on eight-dimensional problems; memory aids significantly aided performance on eight-dimensional problems. Also, performance on four-dimensional problems deteriorated over the series of experimental problems while solution rates for eight-dimensional problems remained stable. The improvements with memory aids suggest that performance on highly complex problems may reflect deficiencies in component processes, notably memory. The deterioration of performance on problems of only moderate complexity may well reflect boredom. Both factors have practical implications which may enable the elderly to utilize more of their cognitive capabilities. (Author)

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Old Dogs Utilizing Old Tricks: Memory and Complex Problem Solving

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Virtually all developmental investigations of problem solving have demonstrated significant performance deficits in elderly samples (Arenberg, 1968; Jerome, 1962; Nehrke, 1973; and Offenbach, 1974). While it is questionable whether age can be interpreted as the causative factor (see Baltes & Labouvie, 1973; Schaie, 1975; Schaie & Labouvie-Vief, 1974), a more pressing consideration is the need to move beyond "counting and classifying the wrinkles of aged behavior" (Kastenbaum, 1968, p. 280) which has characterized gero-psychology (Botwinick, 1970). In fact, Labouvie (1973) has called intervention the challenge for the seventies.

Meichenbaum (1974) suggested that self-instructional training might improve elderly problem solving. However, two recent investigations (Labouvie-Vief & Gonda, 1976, and Panicucci & Labouvie-Vief, 1975) found that "unspecific" training (practice) produced more consistent effects than self instruction.

The goal of the present study was also to maximize elderly performance but it took a different approach: rather than training new skills, the intervention strategy was to explore a procedure which might allow the elderly to employ skills already available. The rationale for this was that a global performance deficit does not necessarily imply a general ability deficit. Instead, it may merely reflect a deficiency in one of the cognitive subprocesses required for successful problem solving.

Developmental research (e.g. see Phillips & Levine, 1975) suggests that memory may be a key component. Previous attempts to facilitate elderly performance by reducing memory demands have yielded mixed results (Brinley, Jovick, & McLaughlin, 1974; Jerome, 1962; Wetherick, 1966; Young, 1966). It was hypothesized that the inconsistent results reflected an interaction with problem complexity since research with college students (Bourne, Goldstein, & Link, 1964) has demonstrated that availability of previous information was less facilitative in problems of lesser complexity.

Four groups of well-functioning senior citizens (six males and 18 females per group) over the age of 65 (mean age = 70.8) were presented with a series of discrimination-learning problems; all solutions were simple, based on one stimulus value. Performance was maximized for all Ss by providing four pretraining problems, appropriate to each S's condition, and encouraging self-pacing. Two levels of problem complexity

(four bivalued dimensions vs. eight bivalued dimensions) were crossed with two levels of a memory-aid variable (limited memory displays provided vs. none provided).

Only limited aids were employed in order to eliminate the potentially confounding influence of a perceptual phenomenon. This made it impossible to equate both number of previous trials kept in view and amount of information-reduction provided since, logically, three trials are required to achieve solution in a four-dimensional problem and four trials are required in an eight-dimensional problem. However, it appeared more important to control for the amount of information which must be retained. The memory-aid conditions in the present study thus exposed an appropriate (albeit different) number of previous stimulus cards such that Ss in each complexity group were only required to remember four possibilities, given the help of the memory displays.

Memory aids were provided as follows: after the feedback interval, instead of removing the stimulus card, E placed it on a display rack together with a feedback marker, and continued with the next trial. For four-dimensional problems, each time a new stimulus card was presented and feedback given, the card on the memory-display rack was replaced by the new stimulus card. The procedure was identical for eight-dimensional problems, except that the two immediately-preceding trials were displayed.

Solution performance (see Table 1) on four-dimensional problems was found to be superior to that on eight-dimensional problems, and the availability of memory aids significantly facilitated performance on eight-dimensional problems. Also, performance on four-dimensional problems deteriorated over the series of four experimental problems while the rate of solution for eight-dimensional problems remained stable. There were no significant effects of sex or E.

The significant complexity x memory-aid interaction clarifies the apparent discrepancies between results of previous investigations. For example, Brinley et al (1974) had found that providing memory aids did not improve performance. However, the most difficult problems they employed were less complex than the four-dimensional problems presented here, which were unaffected by the availability of aids.

The facilitative effect of memory aids suggests that the poor problem-solving performance often found with the elderly is not due to global deterioration in processing ability. General performance defi may simply reflect deficiencies in component processes, especially memory. The fact that memory aids did not produce perfect performance is not incompatible with this thesis, since only a limited display was available.

This study did not provide specific training in heuristic or component skills. The control conditions merely ensured

task clarity, provided practice, and encouraged self pacing. It is thus interesting to note that elderly Ss in these conditions solved 91% of the moderately complex problems and 54% of the highly complex problems; this is substantially superior to children's performance (see Gholson & Danziger, 1975). When limited memory aids were provided, elderly Ss solved 80% of the highly complex problems. Clearly, this indicates that the elderly have sophisticated problem-solving skills available.

In sum, memory aids (just as other aids employed to remediate a handicap) enabled these Ss to utilize much more of their cognitive capabilities. The deterioration in performance on problems of only moderate complexity probably reflects boredom since eight-dimensional performance remained stable even in the absence of memory aids, and the elderly are particularly sensitive to underarousal as well as overarousal (Jarvik & Cohen, 1973).

Both factors have practical implications, suggesting that both memory demands and arousal aspects of a situation must be taken into account when planning recreational and enrichment programs for senior citizens. These include not only the content of such programs but also the mode of presentation of materials and assessment of their effectiveness. There appears to be a danger of determining some tasks as beyond the capabilities of many senior citizens when, in fact,

successful performance could be produced by alleviating some of the memory demands. Likewise, there is the risk of assessing an aged person's abilities solely on the basis of performance on tasks with which (s)he may become easily bored. Exploring such possibilities may enable elderly people to utilize more of the "old tricks" they already have available.

Footnote

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Reference Notes

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Group	Experimental Problem 1		Experimental Problem 2		Experimental Problem 3		Experimental Problem 4		Overall	
	Percent Solved	Mean TLE	Percent Solved	Mean TLE	Percent Solved	Mean TLE	Percent Solved	Mean TLE	Percent Solved	Mean TLE
Four-Dimensional										
No Memory Aid	96	5.1	96	5.0	87	6.9	83	9.9	91	6.7
Memory Aid	96	3.8	96	3.4	83	9.8	83	8.6	90	6.4
Eight-Dimensional										
No Memory Aid	42	17.0	67	12.8	46	16.0	62	13.5	54	14.8
Memory Aid	79	10.4	87	7.8	75	10.2	79	8.8	80	9.3

Table 1. The percentage of problems solved and the mean trial-of-last-error (TLE) across experimental problems for all groups. Each problem consisted of 24 trials, and was considered "solved" if S was correct five times in a row.

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